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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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George G. Chase

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EXAMINER

NELSON, MICHAEL B

ART UNIT

PAPER NUMBER

1794

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/525,693	Applicant(s) CHASE ET AL.	
	Examiner MICHAEL B. NELSON	Art Unit 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 February 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicant's amendments filed on 02/04/09 have been entered. Claims 1-21 are currently under examination on the merits. The previous 112 2nd paragraph rejections and the 101 rejections have been withdrawn as a result of applicant's amendments.

Examiner's Note

2. The use of produce-by-process limitations has been noted in claim 1, such as, for example, "electrospun." Even though a product-by-process is defined by the process steps by which the product is made, determination of patentability is based on the product itself. In re Thorpe, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). As the court stated in Thorpe, 777 F.2d at 697, 227 USPQ at 966 (The patentability of a product does not depend on its method of production. In re Pilkington, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969). If the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.).

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed

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invention. Claim 1 recites that the nanofibers is composed of a “substantially solid nanofiber structure” which does not have support in the specification as originally filed. There is not support for the use of the term “solid” to describe the nanofibers.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites that the nanostructure is substantially solid which is vague and indefinite in that it is unclear what qualifies as a "substantially solid" structure.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-4, 7, 8, 15-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rose et al. (U.S. 5,447,786) in view of Dzenis et al. (U.S. 6,265,333) with evidentiary support from Araki et al. (U.S. 3,666,417).

Regarding claim 1, Rose et al. discloses a high surface area carbon fiber which is coated with a rare earth oxide (optically active in the IR spectra) (C5, L55-C6, L40) with a diameter on the nanometer scale (C6, L45-C7, L11). Rose et al. does not explicitly disclose that the carbon fiber be produced from electrospun polymeric fibers however, one having ordinary skill in the art would recognize that carbon fibers are formed by carbonizing polymeric fibers, especially polyacrylonitrile fibers (See as evidence, Araki et al. C1, L30-45). Rose et al. calls for high surface area nanofibers but does not explicitly mention electrospinning as a method of shaping the fibers. Dzenis et al. which is also directed towards nanoscale fibers (C7, L45-C8, L10) discloses that electrospinning was a known method for making very small (i.e. three nanometer) diameter fibers (C8, L10-C9, L40). Polyacrylonitrile is one such material disclosed for the electrospinning process however the other resin materials could also be used to create carbon fibers (C9, L18). Such extremely small carbon fibers would have increased surface area

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compared to larger diameter fibers of Rose et al. and therefore would be preferable fibers for the high surface area fibers being coated by rare earth nitrides in Rose et al. The fibers of modified Rose et al. are considered substantially solid in that they remain in a fibrous shape (i.e. do not disintegrate or form into a liquid). Hence it would have been obvious to one having ordinary skill in the art to have used ultra-low diameter electrospun polymeric nanofibers as the precursor for the carbon nanofibers because Rose et al. teaches that high surface area fibers are desirable.

Regarding claims 2-4, 7, 8, and 15-20, modified Rose et al. discloses all of the limitations as set forth above. Additionally, Rose et al. discloses that the fiber be a carbon fiber (C6, L25-30) with rare earth, inter alia erbium, oxides coated thereon and impregnated therein (C6, L5-40). Erbium oxide produces colors in the near IR spectrum and the amounts used produce a noticeable emittance of radiation (Fig. 1, the emission is being detected). The use of the rare-earth fiber is with other fibers in a composite structure (i.e. fabric) (See Abstract) for energy conversion (C1, L15-20) in a thermophotovoltaic device (See Fig. 1 and C1, L40-55, thermal energy is converted to photovoltaic energy). The emission of infrared radiation as a result of exposure to combustion (C1, L10-20) makes the line emitter a chemical sensor (Fig. 1).

11. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rose et al. (U.S. 5,447,786) in view of Dzenis et al. (U.S. 6,265,333) with evidentiary support from Araki et al. (U.S. 3,666,417) as applied to claim 1 above, and further in view of Goldstein et al. (U.S. 5,356,487).

Regarding claim 5, Rose et al. discloses all of the limitations as set forth above. Rose et al. does not disclose that the fiber be a SiO fiber.

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Goldstein et al. discloses a nanofiber (C5, L55-60, less than 1 micrometer), with silicon and aluminum oxide (C5, L5-15) formed by impregnating polymeric fibers with nitrates of the desired oxide (i.e. aluminum nitrate to form aluminum oxide fibers) (C5, L50-C6, L62). The fibers have a rare earth coating rare earth coating (C5, L15-50). For the same reasons provided above, it would have been obvious to have used ultra fine nanoscale electrospun polymer precursor fibers for these silicon oxide fibers.

The inventions of both modified Rose et al. and Goldstein et al. are drawn to the field of rare earth coated nanofibers and therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to have modified the carbon base material of modified Rose et al. by using the SiO material as taught by Goldstein et al. because it would amount to nothing more than a use of a known nanofibers base material for its intended use in a known environment to accomplish an entirely expected result.

12. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rose et al. (U.S. 5,447,786) in view of Dzenis et al. (U.S. 6,265,333) with evidentiary support from Araki et al. (U.S. 3,666,417) as applied to claim 1 above, and further in view of Tatarchuk et al. (U.S. 5,102,745).

Regarding claim 6, modified Rose et al. discloses all of the limitations as set forth above. Rose et al. does not disclose the inclusion of a catalyst within the fiber composite.

Tatarchuk et al. discloses that it was known in the art to provide catalyst particles within multifiber composite networks (See abstract) due to the flexibility and low pressure drop of the catalyst containing fiber composite structure as compared to a packed bed structure (C10, L45-65).

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The inventions of both modified Rose et al. and Tatarchuk et al. are drawn to the field of multifiber composite networks and therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to have modified the fiber composite of modified Rose et al. by adding catalysts as taught by Tatarchuk et al. for the purposes of utilizing the structure as a flexible catalyst support.

13. Claims 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rose et al. (U.S. 5,447,786) in view of Dzenis et al. (U.S. 6,265,333) with evidentiary support from Araki et al. (U.S. 3,666,417) as applied to claim 1 above, and further in view of Milstein et al. (U.S. 5,601,661)

Regarding claim 9-14, modified Rose et al. discloses all of the limitations as set forth above. Additionally, modified Rose et al. discloses altering the amount of rare earth metal oxide in the overall composite from between 1-99 wt%. Rose et al. does not specifically disclose the amounts of rare earth metal in the infrared functional fibers.

Milstein et al. discloses that the composition in a mixture of a base oxide (aluminum oxide) and a rare earth oxide (ytterbium) can be altered between 0% ytterbium and 90% ytterbium (C3, L40-C4, L20), which completely overlap the claimed ranges. Milstein et al. discloses that relative amounts of rare earth metal to base material effect the thermophotovoltaic properties, as well as the mechanical strength properties of the composition (C4, L1-20).

Regarding the relative amount of rare earth metal in the optically functional composition, it would have been obvious to one of ordinary skill in the art at the time of invention to have selected the overlapping portion of the ranges disclosed by the reference because overlapping ranges have been held to be a prima facie case of obviousness. In re Malagari, 182 USPQ 549.

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The inventions of both modified Rose et al. and Milstein et al. are drawn to the field of thermophotovoltaic compositions and therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to have modified the amount of rare earth metal in the optically functional nanofibers of modified Rose et al. as taught by Milstein et al. for the purposes of optimizing the thermophotovoltaic and mechanical strength properties.

14. Claims 1 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dzenis et al. (U.S. 6,265,333) in view of Elbert et al. (U.S. 3,565,910),

15. Regarding claims 1 and 21, Dzenis et al. discloses electrospun nanofibers made of, inter alia, nylon (C8, L10-45) for use in composites resistant to environmental conditions (C1, L20-25). Dzenis et al. does not disclose that optical materials be doped into the solution before electrospinning however, Elbert et al. discloses a nylon composition containing pigments which would be beneficial for use as the base material for the electrospun polymer of Dzenis et al. because of its heat and light stabilized properties (i.e. environmental stability). The composition of Elbert et al. is disclosed as containing carbon black in order to adjust the shading of the color (C5, L65-C6, L5). The inventions of both Dzenis et al. and Elbert et al. are directed towards environmentally stable compositions and therefore it would have been obvious to one having ordinary skill in the art to have adjusted the nylon polymer of Dzenis et al. by using the stabilized nylon composition of Elbert et al. for the purposes of imparting increased environmental stability.

Response to Amendment

16. Applicant's arguments filed on 02/04/09 are considered moot in light of the new grounds of rejection which were necessitated by the applicant's amendments. Arguments which are still deemed to be relevant are addressed below.

17. Regarding applicant's arguments towards electrospinning, the examiner agrees that fibers of Rose et al. are not disclosed as being electrospun, however, carbon fibers are formed from polymeric fibers which have been carbonized. Therefore it would have been possible, and indeed preferred in terms of increased surface area, to form electrospun carbon fibers by carbonizing electrospun polymer fibers. Regarding applicant's arguments against the "hollow nature" of the fibers, the examiner does not see what in the prior art indicates that the fibers are hollow; however, even assuming, arguendo, that the fibers were hollow they would still be considered to be "substantially solid."

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL B. NELSON whose telephone number is (571) 270-3877. The examiner can normally be reached on Monday through Thursday 6AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Sample can be reached on (571) 272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David R. Sample/
Supervisory Patent Examiner, Art Unit 1794

/MN/
03/31/09